



To compare airway indices and incidence of difficult intubation in snorers and non- snorers

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Abstract: *Aim:* To evaluate the risk factor for difficult intubation in snorers and non-snorers. To compare difficulty of intubation in snorers and non- snorers.

Methodology: 145 subjects with age group 16-60 year undergoing elective surgery under general anaesthesia were selected. Demographic data such as age, sex, height, weight, and BMI were measured. ASA, Thyromental distance, Sterno-mental distance, Mandibulo-hyoid distance, Inter-incisor distance, Modified Mallampatti grade, intubation difficulty scale, Cormack and Lehane grading, LEMON score, anthropometric examination was performed by a single anesthesiologist to avoid inter-observer variability. **Results:** Out of 145 subjects, there were 40 (50.63%) male and 39 (49.37%) female non- snorers and 27 (40.91%) male and 39 (59.09%) female snorers. Among non- snorers, ASA grade 1 was seen in 60, and grade 2 in 19 subjects and among snorers, ASA grade 1 and 2 was seen in 33 subjects each. The mean MPG among non- snorers was 1.75 and in snorers was 1.94. Cormack & Lehane grade 1 was seen among 56 and 31, grade 2A in 21 and 31, grade 3A in 1 and 4 and grade 3B in 1 and 0 in non- snorers and snorers respectively. The mean IDS among non- snorers was 2.43 and among snorers was 3.06. The mean lemon score among non- snorers was 3.0 and among snorers was 3.18. Number of operator attempting intubation 1 was seen in 79 and 65 and 3 in 0 and 1 among non- snorers and snorers respectively. Number of attempts of intubation was 1 seen in 77 and 58 and 2 in 2 and 8 patients in non- snorers and snorers respectively. **Conclusion:** Snoring had an association with age, female gender, BMI and ASA grade. Snorers had a larger neck circumference, smaller thyromental and mandibulo hyoid distance as compared to non- snorers. It is important to consider these individual risk factors as help in predicting difficult intubation in snorers.

Keywords: Snoring, intubation, Mandibulo-hyoid distance

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INTRODUCTION

The difficult airway defined as “the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation, or both”.^{1,2} Difficult intubation (DI) is one of the leading causes of mortality and morbidity, so it is essential for to evaluate risk factor in every surgical patient.^{3,4} Patients with snoring who pose a potential threate for securing an airway because of reduced space between the posterior pharyngeal wall and base of the tongue, and alterations in craniofacial structure hence more prone to collapse.^{5,6,7}

Collapsibility of pharyngeal airway are more in snorer than non-snorers at the velopharyngeal level.⁸ An anesthesia associated mortality can be reduced by early and proper airway assessment, identifying the risk factor which were associated with difficult airway.^{9,10} There is no single predictor, but multiple predictors when taken in toto can identify difficult airway with more certainty. In our study we are comparing the different airway indices predicting difficult intubation amongst snorers and non-snorers. This study evaluates the relationship between different airway indices and history of snoring in patients under general anesthesia with difficulty of tracheal intubation.

METHODOLOGY

This study was conducted after approval from Institutional Ethical and Research committee. 145 subjects with age group 16-60 year undergoing elective surgery under general anaesthesia were selected. A written and informed consent was obtained before starting the study. Inclusion criteria was patients undergoing general anesthesia with endotracheal intubation, patients with age group 16-60 years and patients with American society of Anaesthesiologist (ASA) physical status I, and II. Exclusion criteria was patients with External neck deformity /malformation of neck or face, patients with STOP BANG score >3, patients with reactive airway disease chronic obstructive pulmonary disease/Asthma, patients with unstable /curved spine deformity, patient with the history of gastroesophageal reflux disease, pregnancy /oropharyngeal mass/ neck surgery and patients not willing to participate in study.

Data such as name, age, etc. was recorded. After explaining the procedure in detail, a thorough pre-anaesthetic assessment, history of snoring, history of previous difficult intubation was done. Demographic data such as age, sex, height, weight, and BMI were measured. ASA, Thyromental distance, Sterno-mental distance, Mandibulo-hyoid distance, Inter-incisor distance, Modified Mallampatti grade, intubation difficulty scale, Cormack and Lehane grading, LEMON score, anthropometric examination was performed by a single anesthesiologist to avoid inter-observer variability.

All patients were kept fasting 6 hours prior to surgery and were premedicated with tablet ranitidine 150mg and tablet Ondansetron 4 mg in night and day of surgery tablet alprazolam 0.25mg in the night. The anesthetic technique remains standardized for all patients. Patient was induced with i.v. fentanyl 2mcg/kg, and injection propofol 2mg/kg till the loss of vocalisation and after checking for ventilation. Intubation was facilitated by i.v. vecuronium 0.1 mg/kg was given for muscle relaxation. Patients were manually ventilated for 3 minutes with 50% nitrous oxide in oxygen and sevoflurane 1 to 2% and direct laryngoscopy with use of a Macintosh number 3-laryngoscope blade for the sake of consistency of the technique. All the intubations were performed by single experienced anesthesiologist who was unaware about the intervention. Cuffed endotracheal tube size used were 7.5 for female and 8.5 in male. Data was recorded- number of attempts/ number of operator attempting intubation, number of alternative techniques used, change of blade or tube, addition of a stylet or bougies, duration of laryngoscopy. Patient was extubated and patient was observed in post anesthesia care unit.

Interpretation and analysis of obtained results was carried out using software Microsoft office Excel 2010 and SPSS IBM version 22, IBM SPSS Statistics base (SPSS South Asia Pvt., Ltd., Bengaluru, India). Distributed data were analysed using the Mann Whitney U test and categorical data was analysed using the Chi square test. P value less than 0.05 was regarded as significant.

RESULTS

Table I Comparison of incidence of snoring in both gender in 2 groups

Gender	Non- Snorers		Snorers		p-value
	N	%	N	%	
Male	40	50.63%	27	40.91%	0.121
Female	39	49.37%	39	59.09%	
TOTAL	79	100%	66	100%	

Out of 145 subjects, there were 40 (50.63%) male and 39 (49.37%) female non- snorers and 27 (40.91%) male and 39 (59.09%) female snorers. The difference was non- significant (P> 0.05) (Table I).

Table II Assessment of parameters in the 2 groups of study population

parameters	Variables	Non- Snorers		Snorers		p-value
		n	%	n	%	
ASA grade	1	60	75.95%	33	50.00%	<0.001
	2	19	24.05%	33	50.00%	

MPG	1	23	29.11%	9	13.64%	0.013
	2	53	67.09%	52	78.79%	0.058
	3	3	3.80%	5	7.58%	0.161
Cormack & Lehane grade	1	56	70.89%	31	46.97%	0.002
	2A	21	26.58%	31	46.97%	0.005
	3A	1	1.27%	4	6.06%	0.058
	3B	1	1.27%	0	0.00%	0.180
Difficulty of intubation (IDS)	2	55	69.62%	26	39.39%	<0.001
	3	18	22.78%	23	34.85%	0.054
	4	3	3.80%	8	12.12%	0.030
	5	2	2.53%	7	10.61%	0.022
	6	1	1.27%	1	1.52%	0.449
	8	0	0.00%	1	1.52%	0.136
Lemon score	3	79	100.00%	58	87.88%	<0.001
	4	0	0.00%	5	7.58%	0.006
	5	0	0.00%	2	3.03%	0.060
	6	0	0.00%	1	1.52%	0.136
	3	79	100.00%	58	87.88%	<0.001
	4	0	0.00%	5	7.58%	0.006
Number of operator attempting intubation	One	79	100.00%	65	98.48%	0.136
	Three	0	0.00%	1	1.52%	
Number of attempts of intubation	One	77	97.47%	58	87.88%	0.012
	Two	2	2.53%	8	12.12%	
alternative techniques used for intubation	Addition of stylet bougies	6	7.59%	16	24.24%	0.003
	Change of blade or tube	0	0.00%	1	1.52%	0.136

Among non- snorers, ASA grade 1 was seen in 60, and grade 2 in 19 subjects and among snorers, ASA grade 1 and 2 was seen in 33 subjects each. The mean MPG among non- snorers was 1.75 and in snorers was 1.94. Cormack & Lehane grade 1 was seen among 56 and 31, grade 2A in 21 and 31, grade 3A in 1 and 4 and grade 3B in 1 and 0 in non- snorers and snorers respectively. The mean IDS among non- snorers was 2.43 and among snorers was 3.06. The mean lemon score among non- snorers was 3.0 and among snorers was 3.18. Number of operator attempting intubation 1 was seen in 79 and 65 and 3 in 0 and 1 among non- snorers and snorers respectively. Number of attempts of intubation was 1 seen in 77 and 58 and 2 in 2 and 8 patients in non- snorers and snorers respectively. The difference was significant ($P < 0.05$) (Table II).

Table III Demographic characteristics between 2 groups of study population

Parameters	Non- Snorers		Snorers		p-value
	Mean	±sd	mean	±sd	
Age (years)	38.37	±10.84	44.39	±10.15	<0.001
Weight (kg)	58.62	±8.23	76.30	±12.91	<0.001
Height (cm)	153.44	±6.81	151.64	±8.16	0.074
BMI (kg/m ²)	24.86	±3.25	33.09	±6.4	<0.001
Neck circumference (cm)	34.46	±2.16	40.77	±3.97	<0.001
Thyromental Distance	6.74	±0.95	4.57	±1.01	<0.001
Sternomental Distance	15.28	±2.25	14.86	±3.09	0.173
Mandibulo- Hyoid Distance	8.11	±1.63	6.87	±2.32	<0.001
Inter Incisor Distance	4.27	±0.52	4.15	±0.49	0.088
Neck circumference (cm)	34.46	±2.16	40.77	±3.97	<0.001
Duration of Laryngoscopy (sec)	8.44	±2.38	12.33	±10.5	<0.001
Duration of Intubation (hr)	1.83	±1.11	1.94	±1.12	<0.001

Among non- snorers, and snorers, mean age was 38.37 years and 44.3 years, mean weight was 58.62 kgs and 76.30 kgs, height was 153.44 cm and 151.64 cm, BMI was 24.86 kg/m² and 33.09 kg/m² and neck circumference was 34.46 cms and 40.7 cms respectively. Among non- snorers, and snorers, the mean thyromental distance was 6.74 and 4.57, sternomental distance was 15.2 and 14.8, mandibulo- hyoid distance was 8.11 and 6.87, inter- incisor distance was 4.2 and 4.15 and neck circumference was 34.4 cm and 40.7 cm respectively. Duration of laryngoscopy was 8.44 seconds in non- snorers and 12.33 seconds in snorers. Duration of intubation was 1.83 hours in non- snorers and 1.94 hours in snorers. The difference was significant (P< 0.05) (Table III).

DISCUSSION

The incidence of snoring increased significantly with age and female predominance was seen. Higher ASA grade, increased BMI, TMD, decreased SMD was less among snorers than non- snorers which was statistically highly significant with increased risk for difficult intubation. A good predictor of difficult airway in obese patient is the neck circumference and was identified as an independent predictor for difficult intubation in snorers. A unit increase in the Neck circumference increased the DI by 0.036 units. Higher grades of CL grade was associated with difficult intubation and identified as an independent predictor for difficult intubation. In our study as CL grade increased the DI increased by unit of 1.266 units in CL grade 2 while DI increased by unit of 2.790 units for CL Grade 3. IDS score was more among snorers. Taking IDS ≥5 as difficult as a difficult intubation the incidence of DI in our study was 8.27% which is in accordance with various study. In our study out of the 7 patients who had IDS ≥5 we had to use increased force in 6 patients and external laryngeal manipulation in 2 patients. The LEMON score was higher in snorers as compared to non- snorers. Duration of laryngoscopy was more in snorers as compared to non- snorers. In our study we found 58 (87.88%) snorers were intubated in single attempt and 2nd attempt for intubation was taken in 8 (12.12%) snorers which was significant. All 79 (100.00%) non- snorers patient were intubated by a single operator whereas 3 operators attempted intubation in 1 (1.52%) snorer. The addition of stylet /bougies was 6 (7.59%) among non- snorers and 16 (24.24%) with a p-value 0.003 which was higher in snorers than non- snorers. There was no failed intubation in our study. Our study found in comparison to CL Grade, the DI will increase by 1.266 units for CL Grade 2. In comparison to CL Grade, the DI will increase by 2.790 units for CL Grade 3. Sandeep et al¹¹ found that the incidence of snoring increased significantly with age, neck circumference and obesity (BMI in snorers was significantly higher when compared with non- snorers). The incidence of snoring was significantly higher in males, hypertensive and diabetic population. It was significantly difficult to perform bag and mask ventilation in snorers. Out of the 134 patients 51 patients belonged to the higher Modified Mallampati Class (III - IV). Of them 35 were snorers

and only 16 of them were non snorers. There were 6 patients who had a MMG IV and all of them were snorers. Among the 134 patients in the study group 37 of them had a CLG 3/4. Of them 33 of them were snorers and only 4 of them were non snorers. The degree of glottic visualisation which is one of the predictors of ease of intubation was much better in non-snorers (p 0.001). Difficulty in intubation, given by the IDS was compared using the Mann-Whitney Test and it was found to be significantly difficult (p 0.001) to intubate a patient with history of snoring.

A unit increase in the Neck circumference will increase the DI by 0.036 units. The limitation of our study was that we did not predict the best parameter amongst LEMON Score and IDS to predict the DI.

CONCLUSION

We could conclude that snoring had an association with age, female gender, BMI and ASA grade. Snorers had a larger neck circumference, smaller thyromental and mandibulo hyoid distance as compared to non- snorers. It is important to consider these individual risk factors as help in predicting difficult intubation in snorers. The Intubation Difficulty scale and Lemon score were higher in snorers. Multivariate analysis identified neck circumference, CL grade 2 and CL grade 3 best set of predictors of difficult intubation in snorers. The difficult airway prediction lead to a better management of difficult airway, possibly reducing the morbidity and mortality which result from hypoxia or anoxia with failure of ventilation.

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